

WHAT IS CLAIMED IS:

1. A method for Computed Tomography scanners using multiple tilted reconstruction planes, said method comprising:

view weighting data in accordance with

$$\chi(\beta, \gamma) = \begin{cases} w_b & 0 \leq \beta \leq 2\gamma_m - 2\gamma \\ 1 & 2\gamma_m - 2\gamma < \beta \leq \pi - 2\gamma \\ w_t & \pi - 2\gamma < \beta \leq \pi + 2\gamma_m \end{cases}$$

$$\omega(\beta, \gamma) = 3\chi^2(\beta, \gamma) - 2\chi^3(\beta, \gamma)$$

where  $\beta$  is a central view angle,  $\gamma$  is a fan angle,  $\gamma_m$  is a maximum half fan angle of an x-ray beam, and  $w_b$  and  $w_t$  are each weights no greater than 1.

2. A method in accordance with Claim 1 wherein  $w_b$  is calculated by

$$w_b = \frac{e_t}{e_t + e_b} \quad \text{with} \quad e_b = \int_0^{\frac{\pi}{2} + \gamma_m} |AT(\beta) - VT(\beta)| d\beta \quad \text{and} \quad e_t = \int_{\frac{\pi}{2} + \gamma_m}^{\pi + 2\gamma_m} |AT(\beta) - VT(\beta)| d\beta$$

where  $AT(\beta)$  is an actual helical x-ray source trajectory (AT) of  $\beta$  and  $VT(\beta)$  is a virtual x-ray source trajectory (VT) of  $\beta$ .

3. A method in accordance with Claim 1 wherein  $w_t$  is calculated by

$$w_t = \frac{e_b}{e_t + e_b} \quad \text{with} \quad e_b = \int_0^{\frac{\pi}{2} + \gamma_m} |AT(\beta) - VT(\beta)| d\beta \quad \text{and} \quad e_t = \int_{\frac{\pi}{2} + \gamma_m}^{\pi + 2\gamma_m} |AT(\beta) - VT(\beta)| d\beta$$

where  $AT(\beta)$  is an actual helical x-ray source trajectory (AT) of  $\beta$  and  $VT(\beta)$  is a virtual x-ray source trajectory (VT) of  $\beta$ .

4. A method in accordance with Claim 2 wherein  $w_t$  is calculated by

$$w_t = \frac{e_b}{e_t + e_b} \quad \text{with} \quad e_b = \int_0^{\frac{\pi}{2} + \gamma_m} |AT(\beta) - VT(\beta)| d\beta \quad \text{and} \quad e_t = \int_{\frac{\pi}{2} + \gamma_m}^{\pi + 2\gamma_m} |AT(\beta) - VT(\beta)| d\beta$$

where  $AT(\beta)$  is an actual helical x-ray source trajectory (AT) of  $\beta$  and  $VT(\beta)$  is a virtual x-ray source trajectory (VT) of  $\beta$ .

5. A method in accordance with Claim 1 wherein  $w_t$  is between .5 and .1, and  $w_b$  is between .5 and .9.

6. A method in accordance with Claim 1 wherein  $w_b$  is between .5 and .1, and  $w_t$  is between .5 and .9.

7. A method in accordance with Claim 5 wherein  $w_t$  is between .4 and .2, and  $w_b$  is between .6 and .8.

8. A method in accordance with Claim 6 wherein  $w_b$  is between .4 and .2, and  $w_t$  is between .6 and .8.

9. A method in accordance with Claim 1 wherein  $w_t$  is about .4 and  $w_b$  is about .6.

10. A method in accordance with Claim 1 wherein  $w_t$  is about .6 and  $w_b$  is about .4.

11. A Computed Tomography (CT) system comprising:

an x-ray source;

a detector positioned to receive x-rays emitted from said source; and

a computer operationally coupled to said source and said detector, said computer configured to:

receive data from a scan of an object; and

weight the received data in accordance with

$$\chi(\beta, \gamma) = \begin{cases} w_b & 0 \leq \beta \leq 2\gamma_m - 2\gamma \\ 1 & 2\gamma_m - 2\gamma < \beta \leq \pi - 2\gamma \\ w_t & \pi - 2\gamma < \beta \leq \pi + 2\gamma_m \end{cases}$$

$$\omega(\beta, \gamma) = 3\chi^2(\beta, \gamma) - 2\chi^3(\beta, \gamma)$$

where  $\beta$  is a central view angle,  $\gamma$  is a fan angle,  $\gamma_m$  is a maximum half fan angle of an x-ray beam, and  $w_b$  and  $w_t$  are each weights no greater than 1.

12. A system according to Claim 11 wherein  $w_t$  is between .5 and .1, and  $w_b$  is between .5 and .9.

13. A system according to Claim 11 wherein  $w_t$  is between .5 and .9, and  $w_b$  is between .5 and .1.

14. A system according to Claim 11 wherein  $w_t$  is between .4 and .2, and  $w_b$  is between .6 and .8.

15. A system according to Claim 11 wherein  $w_t$  is between .6 and .8, and  $w_b$  is between .4 and .2.

16. A system according to Claim 11 wherein  $w_t$  is about .4 and  $w_b$  is about .6.

17. A system according to Claim 11 wherein  $w_t$  is about .6 and  $w_b$  is about .4.

18. A method of obtaining and using weights, said method comprising:

setting  $w_b = \frac{e_t}{e_t + e_b}$  and  $w_t = \frac{e_b}{e_t + e_b}$  with

$$e_b = \int_0^{\frac{\pi}{2} + \gamma_m} |AT(\beta) - VT(\beta)| d\beta \text{ and } e_t = \int_{\frac{\pi}{2} + \gamma_m}^{\pi + 2\gamma_m} |AT(\beta) - VT(\beta)| d\beta \text{ wherein } AT(\beta) \text{ is an}$$

actual helical x-ray source trajectory (AT) of  $\beta$  and  $VT(\beta)$  is a virtual x-ray source trajectory (VT) of  $\beta$ ; and

weighting image data with  $w_b$  and  $w_t$  prior to filtering and backprojecting the image data to reconstruct an image.

19. A method according to Claim 18 wherein  $w_t$  is between .5 and .1.

20. A method according to Claim 18 wherein  $w_b$  is between .5 and .1.

21. A method according to Claim 18 wherein  $w_b$  is between .5 and .9.

22. A method according to Claim 18 wherein  $w_t$  is between .5 and .9.

23. A method according to Claim 18 wherein  $w_b$  is between .5 and .9 and  $w_t$  is between .5 and .1.

24. A method according to Claim 18 wherein  $w_t$  is between .5 and .9 and  $w_b$  is between .5 and .1.

25. A computer readable medium encoded with a program configured to instruct a computer to:

receive data from a scan of an object; and

weight the received data in accordance with

$$\chi(\beta, \gamma) = \begin{cases} w_b & 0 \leq \beta \leq 2\gamma_m - 2\gamma \\ 1 & 2\gamma_m - 2\gamma < \beta \leq \pi - 2\gamma \\ w_t & \pi - 2\gamma < \beta \leq \pi + 2\gamma_m \end{cases}$$

$$\omega(\beta, \gamma) = 3\chi^2(\beta, \gamma) - 2\chi^3(\beta, \gamma)$$

where  $\beta$  is a central view angle,  $\gamma$  is a fan angle,  $\gamma_m$  is a maximum half fan angle of an x-ray beam, and  $w_b$  and  $w_t$  are each weights no greater than 1.

26. A medium in accordance with Claim 25 wherein said program further configured to instruct the computer to weight the received data in accordance with

$$\chi(\beta, \gamma) = \begin{cases} w_b & 0 \leq \beta \leq 2\gamma_m - 2\gamma \\ 1 & 2\gamma_m - 2\gamma < \beta \leq \pi - 2\gamma \\ w_t & \pi - 2\gamma < \beta \leq \pi + 2\gamma_m \end{cases}$$

$$\omega(\beta, \gamma) = 3\chi^2(\beta, \gamma) - 2\chi^3(\beta, \gamma)$$

wherein  $w_t$  is about .4.

27. A medium in accordance with Claim 25 wherein said program further configured to weight the received data in accordance with

$$\chi(\beta, \gamma) = \begin{cases} w_b & 0 \leq \beta \leq 2\gamma_m - 2\gamma \\ 1 & 2\gamma_m - 2\gamma < \beta \leq \pi - 2\gamma \\ w_t & \pi - 2\gamma < \beta \leq \pi + 2\gamma_m \end{cases}$$

$$\omega(\beta, \gamma) = 3\chi^2(\beta, \gamma) - 2\chi^3(\beta, \gamma)$$

wherein  $w_b$  is about .6.